1	2	3
National Mineral Development Corporation (NMDC)		
Bailadila-14	1702	410
Bailadila-5	1674	550
Donimalai	1253	310
Panna	342	75
CWS	67	—
Head Office	287	55
R& D	74	40
Delhi	10	—
Mumbai	5	—
Kolkata	10	—
Chennai	9	—
Bangalore	4	—
Raipur	30	30
Bhubaneshwar	6	—
Vizag (R.O.)	33	25
S/P	6	—
UPFO	3	—
NISP	54	—
Arki	1	—
Bababudan	1	—
Lalapur	10	—
JKMDC	1	—
TOTAL:	5582	1495

Less expenditure by public and private sector on research and development

928. SHRI RAJKUMAR DHOOT: Will the Minister of STEEL be pleased to state:

(a) whether it is a fact that public sector and private sector steel projects have been spending less than 1 per cent of turnover on research and development;

(b) if so, the details thereof and the reasons for small investment in R&D; and

(c) the major breakthrough in R&D by steel sector during last three years?

THE MINISTER OF STATE IN THE MINISTRY OF STEEL (DR. AKHILESH DAS): (a) Yes, Sir.

(b) Research & Development (R&D) in steel sector in India is pursued mainly at the in-house R&D centres of Steel Authority of India Ltd. (SAIL) and Tata Steel Ltd. (TSL). Details of expenditure on R&D in these companies during last 3 years are as under:

(*Rs. in crores*)

Year	R&D Expenditure		R&D Expenditure as % of Turnover	
	SAIL	TSL	SAIL	TSL
2004-05	60.58	33.70	0.19	0.21
2005-06	63.48	25.00	0.19	0.21
2006-07	76.85	33.25	0.20	0.24

Normally, The aforesaid steel plants have been taking up incremental research work involving low investment.

In other steel plants, which have been set up recently, new R&D laboratories are being set up or the existing facilities are being augmented.

(c) Major achievements in R&D in SAIL and Tata Steel Ltd. during last three years are given in the Statement.

Statement

Major achievements in R &D in steel sector during last three years

A. Steel Authority of India Ltd.

Technology Development

- On-line Control of coking process in coke oven batteries resulting in reduction of energy consumption by 5% and improvement in coke strength by 0.5 points.
- Curtain flame ignition system in sinter machines resulting in curtailment of specific gas consumption by 30%, increase in productivity by 10% and ensured consistency in sinter quality through uniform heating ($\pm 10^{\circ}C$) across the width of the sinter machine.
- Automated secondary cooling system in continuous caster resulting in elimination of reheating crack in medium carbon, high carbon and SUP 11A grades of cast billet.
- Development of round ingot technology for yield and quality improvement in wheels resulting reduction in the weight variation in blocks could be reduced from 40 to 15 kg. increase in yield from 70 to 90% at ingot to block stage.

New Product Development

- Medium Carbon (MC 11, MC 12) hot rolled coils for cold reducing and engineering fabrication segment.
- Titanium bearing LPG grade steel for auto cylinders.
- High strength LPG Steel equivalent to EN 10120 P265 NB and JISG 3116 SG 255/ 295 for export quality cylinders.
- SAIL HITEN 690 AR grade plates for ATM chests and earth movers.
- SAIL MA 550 HI plates for pen stocks for hydel power plants.
- Spade grade armour plates for main battle tank and bullet proof railway wagon.
- Target grade armour plates for testing indigenously made ammunition for war applications.
- High strength roof bolt grade Thermo Mechanically Treated (TMT) rebars for underground mining.
- Earthquake Resistant (EQR) TMT rebars in Fe 500 grade for safety of RCC structures in earthquake prone arears. High SUP 11 A grade spring steel billets for manufacture of leaf and helical springs for commercial vehicles.
- High Corrosion Resistant (HCR) variety of EQR TMT rebars have been developed.

  DMR 249 Gr A plates/HR coil for naval warship applications.
- High strength vanadium micro-alloyed rails in tracks to be used for goods movement with higher axle load and at high speed. The rails will be used in the 'freight corridor' being developed by Indian Railways.

B. Tata Steel Ltd.

- Development of a new chemical compound to enhance the efficiency of beneficiation of coal resulting in substantial increase in yield at the same ash level.
- Beneficiation of Lean Grade iron-ore to increase iron value and to reduce alumina content.
- Pilot plant study to produce hydrogen gas using access heat and waste water of the steel plant.
- Development of advanced coatings on steel eliminating the use of chromium passivation and reducing the use of zinc.
- Development of new technology for reduction of hexavalent chromium in chromium- ore concentrate using significantly less electrical energy.
- Development of new high strength (800 MPA) Hot Rolled steel with high formability (greater than 20% elongation).